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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/628,661	07/28/2000	Norihiro Kawatoko	862.C1966	3244

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EXAMINER
MOUTTET, BLAISE L

ART UNIT	PAPER NUMBER
2853	

DATE MAILED: 02/25/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/628,661	KAWATOKO ET AL.	
	Examiner	Art Unit	
	Blaise L Mouttet	2853	

-- The MAILING DATE of this communication appears on the cover sheet with th correspond nce address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *13 January 2003* .

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-35* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-35* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☒ The proposed drawing correction filed on *12 July 2002* is: a)☒ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submissions filed on July 12, 2002 and January 13, 2003 have been entered.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. Claims 1-3, 7, 11, 12-14, 18, 22-27 and 29-32 34,35 are rejected under 35 U.S.C. 102(b) as being anticipated by Stephany et al. US 5,497,174. BM 7/7/2003

Stephany et al. discloses, regarding claims 1 and 12, a printing apparatus and printing method comprising:

counting means (48, 50) for performing a counting step of counting the number of simultaneously driven printing elements of a plurality of printing elements when printing data is printed (column 5, lines 8-13, column 5, lines 45-49);

determining means (46) for performing a determination step of determining a fundamental pulse width on the basis of driving conditions according to a condition of the print head wherein the conditions include temperature, desired spot size and ink type (column 6, lines 19-39); and

control means (54) for performing a control step of controlling a drive pulse to be applied to printing elements used in the printing of the printing data, wherein the driving pulse is a pulse generated by correcting the fundamental pulse width determined by said determining means/step (46) on the basis of the number of simultaneously driven printing elements counted by the counting means/step (48, 50) (figure 4, column 6, lines 57-column 4, lines 12).

Stephany et al. discloses, regarding claims 2 and 13, that the driving conditions include at least environmental temperature (column 6, lines 57-63).

Stephany et al. discloses, regarding claims 3 and 14,

storage means (46) for performing a storing step of storing first look-up tables (management tables) for managing the correspondence of the driving conditions with the fundamental pulse width (column 6, lines 19-39), a second look up table (management table) for managing the correspondence of the fundamental pulse width with a change amount of the fundamental pulse width based upon the number of simultaneously driven printing elements (column 5, lines 31-44); and

second determining means for performing a step of determining a change of the pulse width in accordance with the second look up table associated with the number of printing elements counted (column 5, lines 45-49),

wherein said first determining means/step (46) determines the fundamental pulse width using the first look up tables based on spot size, temperature, ink type (column 6, lines 19-38), and

said control means/step (54) changes the fundamental pulse width determined by said second determining means to generate a driving pulse to be applied to printing elements used in the printing of print data (column 6, line 57 - column 7, line 12).

Regarding claims 7 and 18, the driving pulse, which increases as the number of simultaneously driven ink ejecting resistors increases (column 5, lines 47-49), experiences a decrease when the number of simultaneously driven ink ejectors exceeds a predetermined value (see column 7, lines 7-12 which explains that the output of the thermistor 60 determines the predetermined value). The examiner notes that it is inherent that an increase in the number of simultaneously driven ink ejectors increases the temperature of the print head since each ink ejector driven converts electric energy to thermal energy (see column 6, lines 43-51 of Stephany et al.).

Regarding claims 11 and 22, the print head is a thermal ink jet print head (column 2, lines 8-10).

Regarding claim 23, program codes for the discriminating and control steps are inherent since these steps are performed by ROM (44) and ink jet logic (54).

Regarding claims 24 and 29, the fundamental pulse width is selected and determined from a plurality of pulse widths (column 5, lines 31-37).

Regarding claims 25 and 30, the driving conditions include print head characteristics including the temperature and the position of the resistors on the print head (column 6, lines 57-63).

Regarding claims 26, 27, 31 and 32, Stephany et al. discloses that an index value (in increments of 1/8 of a microsecond) is formed representing a change in fundamental pulse width based on the number of simultaneously driven print elements (column 5, lines 31-37) and that the value of this index which modifies the pulse width is based upon printing conditions representative of a print mode (spot size, ink color) stored in look up tables (column 6, lines 19-39).

Regarding claims 34 and 35, the fundamental pulse width is determined based on a plurality of driving conditions including temperature, ink color and spot size (column 6, lines 19-39).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

3. Claims 6 and 17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Stephany et al. US 5,497,174 in view of Corrigan et al. US 6,183,056.

Stephany et al. fails to disclose that independent power lines for sending power to a plurality of print heads are individually controlled.

Corrigan et al. teaches providing separate control lines between separate quadrants of inkjet printheads (column 2, line 49 - column 3, line 3).

It would have been obvious for a person of ordinary skill in the art at the time the invention was made to individually control separate power lines going to separate print heads in the apparatus of Stephany et al. as taught by Corrigan et al.

The motivation for doing so would have been in order to compensate for variations between separate printheads as taught by column 1, line 49 - column 2, line 22 of Corrigan et al.

4. Claims 4, 5, 10, 15, 16 and 21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Stephany et al. US 5,497,174 in view of Nagoshi et al. EP 626 266.

Stephany et al. discloses, regarding claims 5 and 16, storage means (46) for storing a first management table managing the correspondence of the fundamental pulse width with driving conditions (spot size, ink type, temperature) in column 6, lines 19-39 and a second management table managing the correspondence of the pulse width with the number of driven print elements (column 5, lines 45-60).

Stephany et al. fails to disclose, regarding claims 4, 5, 15 and 16, that the fundamental pulse width is defined by one of leading and trailing edges or setting up a management table for managing correspondence between the rise and fall time and the pulse width.

Stephany et al. fails to disclose, regarding claims 10 and 21, that predischarge recovery of the print head is performed.

Nagoshi et al. discloses forming a pulse width for driving an ink jet print head from a preheat (predischarge) recovery pulse (P1) and an ejection pulse (P3) (figure 15, page 11, line 52 - page 12, line 7), that the pulse widths are defined by leading and trailing edges (figure 33) in which a management table is stored for controlling the pulse widths on the basis of drive conditions (figures 30-32, page 20, lines 36-53).

It would have been obvious to a person of ordinary skill in the art at the time the invention was made to include a predischarge recovery pulse in the pulse disclosed by Stephany et al. and define the pulse by the leading or trailing edges as disclosed by Nagoshi et al.

The motivation for doing so would have been in order to better control the temperature of the inks used in the printhead of Stephany et al. as taught by page 11, line 52 - page 12, line 7 of Nagoshi et al. so that the droplet size is stable at elevated temperatures.

5. Claims 8 and 19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Stephany et al. US 5,497,174 in view of Wysocki et al. US 5,223,853.

Stephany et al. discloses that the temperature in the printhead is directly related to the number of simultaneously firing resistors and that this requires adjustment of the firing pulse width (column 6, lines 43-52).

Stephany et al. fails to disclose increasing a change amount for the driving pulse width when the number of simultaneously driven printing elements is less than a predetermined value.

Wysocki et al. teaches increasing a driving pulse width for an ink jet printer as the temperature of the print head (which is directly related to the number of actuated printing elements as taught by Stephany et al.) decreases as shown in figure 2B (column 3, lines 9-16).

It would have been obvious to a person of ordinary skill in the art at the time the invention was made to increase a change amount for the driving pulse of Stephany et al. as shown by Wysocki et al. when the number of simultaneously driven printing elements decreases below a predetermined value.

The motivation for doing so would have been to obtain a dot of desired size on a copy sheet as taught by column 4, lines 53-65 of Wysocki et al.

6. Claims 9 and 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Stephany et al. US 5,497,174 in view of Ebisawa US 5,289,207.

Stephany et al. fails to disclose making a pulse width used for predischarge for recovering said printhead larger than a pulse width of a driving pulse used for printing when the number of simultaneously driven elements for predischarge is limited.

Ebisawa teaches applying a pulse width during a recovery predischarge larger then a pulse width during printing to increase discharge energy during recovery (see abstract, column 6, lines 10-15).

It would have been obvious to a person of ordinary skill in the art at the time of the invention to make the applied pulse width during predischarge larger than the

applied pulse width during printing in the method and apparatus of Stephany et al. as taught by Ebisawa.

The motivation for doing so would have been to perform a recovery operation for the printhead that would enable a longer lifespan for the printhead as taught by column 2, lines 26-30 of Ebisawa.

7. Claims 28 and 33 are rejected under 35 U.S.C. 103(a) as being unpatentable over Stephany et al. US 5,497,174 in view of Courtney US 5,610,638.

Stephany et al. discloses that various look up tables can be formed based on printing modes to determine the change of pulse width in order to maintain a normal drop size (column 6, lines 19-39).

Stephany et al. fails to show utilization of a complementary printing mode for printing in accordance with a printing pass count to establish the normal drop size.

Courtney discloses using a single pass mode or a double pass mode for an ink jet print head in order to maintain a normal drop size (column 2, lines 31-52).

It would have been obvious to a person of ordinary skill in the art to include a complementary double pass mode as shown by Courtney as one of the printing modes disclosed by Stephany et al.

The motivation for doing so would have been in order to better control the ink drop size in accordance as taught by Courtney (column 2, lines 31-33).

Response to Arguments

8. Applicant's arguments filed January 13, 2003 have been fully considered but they are not persuasive.

The applicant has argued that Stephany et al. fails to disclose that a fundamental pulse width is determined based on a driving condition and that a driving pulse is generated by correcting that fundamental pulse width based upon a counted number of simultaneously driven printing elements.

The examiner disagrees.

Stephany et al. clearly states on column 6, line 57-63 that

> FIG. **4** shows a system diagram which compensates for a voltage drop of pulse signals applied to heater elements **26** by compensating for the number of heater elements **26** to be fired, the position on the printhead of the heater elements **26** to be fired as well as the temperature of the printhead at any time. Thermistor **60**, which can be located on the printhead, measures the temperature of the printhead. The measured

The examiner fails to see how the applicant's claim of a pulse width correction based on the number of simultaneously driven printing elements is different from the teaching of Stephany et al. of the pulse width compensation based on the number of simultaneously driven printing elements. It seems to the examiner that applicant's arguments are of the nature that the pulse width in applicant's invention is set based on temperature and other driving parameters first and then further corrected based upon the number of simultaneously driven printing elements whereas the pulse width of Stephany et al. is set considering both of the number of simultaneously driven printing

elements and the temperature and other driving parameters concurrently. However the current claim language does not adequately reflect this feature since no particular order of adjustment of the pulse width is claimed. Even if such an order were claimed the examiner questions why the order of correction is significant in that there seems to be functional equivalence regardless of the order in which the pulse is adjusted. Prior court rulings have held that reordering of performing process steps disclosed in the prior art is prima facie obvious in the absence of new or unexpected results produced by the reordering or wherein the reordering is contrary to the prior art. See for example *In re Burhans*, 154 F.2d 690, 69 USPQ 330 (CCPA 1946).

Contact Information

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Examiner Blaise Mouttet whose telephone number is (703) 305-3007. The examiner can normally be reached on Monday-Friday from 8:30 a.m. to 5:00 p.m.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, John E. Barlow, Jr. Art Unit 2853, can be reached on (703) 308-3126. The fax phone number for the organization where this application or proceeding is assigned is (703) 305-3432.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.

Blaise Mouttet February 13, 2003

BM 2113/2003

LAMSON NGUYEN
PRIMARY EXAMINER
02/25/03